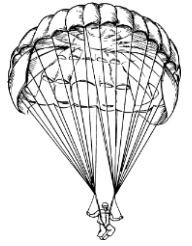


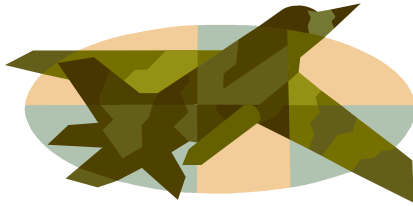
Name: \_\_\_\_\_

Lab Partners: \_\_\_\_\_



### **Background Information:**

Aeronautical engineers design parachutes. Parachutes are designed to slow the fall of a person from the air to the ground to prevent death or injury. Parachutes are designed to use air resistance, drag, or friction: to counteract the weight of the person being “pulled” toward the ground by gravity (see image). Drag (friction) is the force opposite of motion; it slows motion as something travels through the air. To increase the drag/friction on an object falling, you increase the surface area. This explains why planes have huge wings. The large wings increase the friction between the air and the plane, slowing it down as it approaches the runway.



**The word DRAG can be replaced with?**

\_\_\_\_\_ **AND Air resistance: they all mean the forces that slow down, and resist motion. Our unit uses the word friction the most to describe this force.**

### **Your Task:**

The goal of this lab is to create a parachute with the slowest speed (speed= distance/time). Each team will create their own parachute. You will design a procedure to test your parachute. Once you are given materials you will not be provided with additional materials. In other words, don't rip/break your materials.

**Materials:**

You will be provided with a ruler, a timer and with THREE of the following:

**CIRCLE YOUR CHOICES**

- Coffee filter
- Plastic bag
- Wax paper
- String
- Yarn
- Elastic bands
- Paper clips

**Sketch:**

Work with your lab partners to decide what materials you will sketch an image of what your design will look like. **ALL WILL SKETCH THE DESIGN.** Label: with arrows: your mass, the forces of gravity and where drag (friction) exists.

SKETCH:

**Scientific Method:**

Problem Question: What is the effect of surface area on speed?

Independent Variable: \_\_\_\_\_

Dependent Variable: \_\_\_\_\_

What will you keep constant? List 2 things

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**Procedure:**

You must create a list of steps that are re-creatable. The steps must be numbered and include multiple trials and be specific. DO NOT USE: Gather materials, put on safety materials, or words like it, they, stuff.... Your list should be at least 5 steps.

1.

2.

3.

4.

5.

6.

7.

**Data Table:**

The Distance I dropped the parachute from is: \_\_\_\_\_

	<b>Trial 1 Time</b>	<b>Trial 2 Time</b>	<b>Trial 3 Time</b>	<b>Average Time (s)</b>	<b>Speed= D/T</b>
<b>Mass: g</b>					
<b>Mass: g</b>					
<b>Mass: g</b>					

**Relationship I Discovered:**

Surface Area goes UP THEN Speed goes \_\_\_\_\_

Surface Area Goes Up THEN Friction (drag) goes \_\_\_\_\_

**Conclusion Paragraph: RATE**

R: restate your problem question WORD FOR WORD

A: answer your question with what you found out

T: text evidence (3 pieces of data)

E: explain what you discovered

**Mistakes and Fixes:**

Can you brainstorm any mistakes that your group may have done accidentally, think about what you would do differently if you could re do this lab. List 2-3 things.